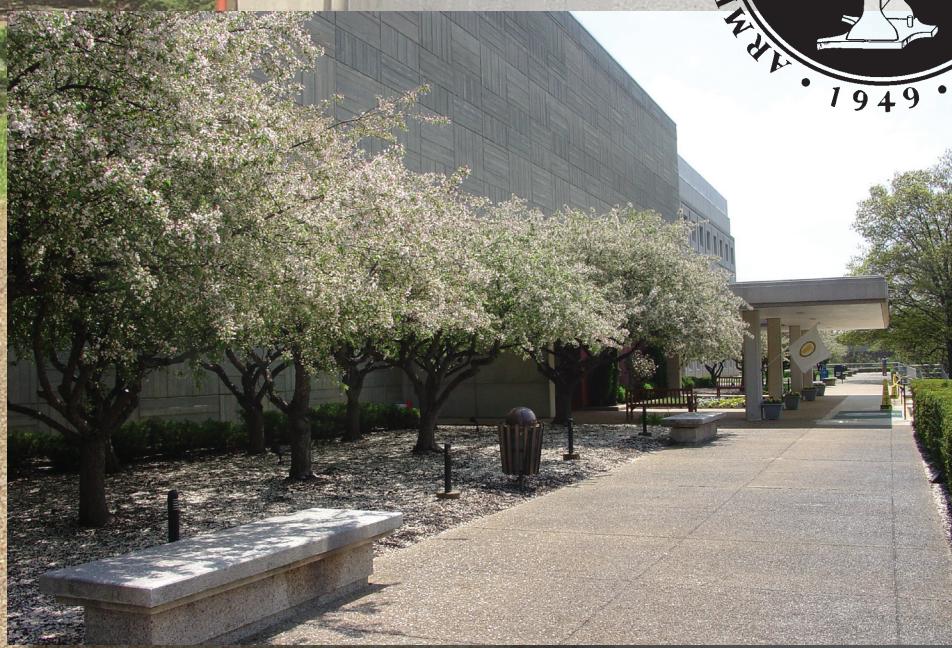
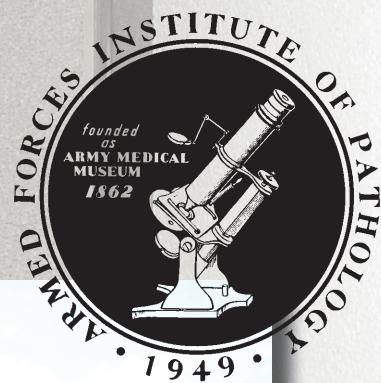




# Armed Forces Institute of Pathology Annual Report 2008



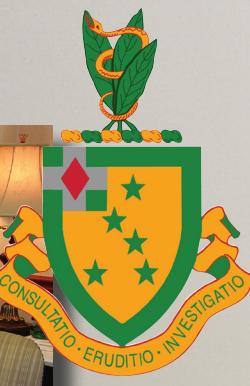


# The AFIP: Maintaining its Service to the Worldwide Medical Community

Founded in 1862 as the Army Medical Museum, the Armed Forces Institute of Pathology (AFIP) has transformed itself from collecting diseased organs and bones for study to a tri-service agency dedicated to expert pathology consultation, education, and research. Located on the Walter Reed Army Medical Center campus, the AFIP plays a critical role in the safety of America's service members, providing research that revolutionizes medical treatment and protection in the battlefield. With a Central Repository, the National Museum of Health and Medicine, customized laboratories, educational resources, and a staff of skilled pathologists, the AFIP provides the Department of Defense with a capability unmatched by any other pathology institute. In 2008, the AFIP continued its mission to provide expert diagnostic consultation and pre-eminent educational resources, as well as providing a wealth of research materials to the military medical community, academia, and commercial markets. The Institute's 2008 highlights demonstrate its renowned consultation, education and research work in which:

- 23 subspecialty departments consulted on over 45,000 cases, resulting in better clinical care and treatment for soldiers and civilians. Military and civilian medical centers depended on the AFIP for quick, efficient, correct consultations that could lead to changed diagnosis, improved patient care and potentially saving lives.
- The AFIP's Central Repository continues to accumulate rare and standard tissue samples in its rich collection, already having amassed over 7 million cases. The division installed a state-of-the-art third vertical lift system enabling efficient retrieval of standard and uniquely-sized glass slides. The Victor J. Ferrans Digital Repository installed SNOMED coding and added digital case files, making the Repository more accessible and efficient for research.
- The Department of Telemedicine traveled throughout the US and abroad, installing scanning devices for rapid consultation. The Institute established new collaborations, assisting the military and foundations in researching diseases afflicting our service members. An embedded metal registry was launched as part of a key study into the effects of blasts received in the battlefield on the brain.
- Having just received a prestigious 5-year accreditation, the Department of Medical Education held 28 live courses and maintained its status as a premium resource. The Department developed a new course to train pathologists for mass fatality incidents, and brought their esteemed Neuropathology Review to New Orleans, an area with very limited medical education resources in the wake of Hurricane Katrina.

2008 was marked by the AFIP's continued dedication to the American service member and the American people.





## A Year of Challenges and Perseverance

In the many years I have served at the Armed Forces Institute of Pathology (AFIP) I can honestly say 2008 was one of the most challenging I have ever experienced, both personally and from an institutional perspective.

The Base Realignment and Closure law, which requires that the AFIP be disestablished in 2011, and subsequent legislation requiring standing up of a Joint Pathology Center (JPC) before the BRAC process could move forward, meant that a cloud of uncertainty and confusion hung over the Institute. This fact threatened to instill a sense of institutional paralysis. All of us—regardless of when we began our work with the AFIP—instantly became rich with an inheritance bequeathed to us through decades upon decades of honorable service by those who have helped make the Institute a world leader in pathology consultation, education, and research. It is difficult to see such an inheritance threatened, never mind preparing ourselves for the prospect of having to let it go.

Despite all these challenges, I am proud to say that the staff of the AFIP was able to rise above the uncertainty and confusion to make 2008 a year of continued forward progress. By remaining acutely focused on dedication to excellence in customer service, we avoided the danger of institutional paralysis and embraced the simple rewards of hard work and work done well for the betterment of others.

This is evident in the many areas the AFIP was recognized for excellence. The Institute itself received renewed accreditation by the Commission on Laboratory Accreditation of the College of American Pathologists (CAP). In the Institute's Department of Environmental and Infectious Disease Sciences, a Registry on Embedded Metal Fragments was established—a first step in creating a mechanism for tracking DoD personnel bearing potentially hazardous embedded metal fragments. CNN and French Television touted the importance of this project and its forward-leaning approach both nationally and internationally. Additionally, the Institute's Laboratory Animal Care Program received a continued Full Accreditation award from the Association for Assessment and Accreditation of Laboratory Animal Care International. The Council applauded AFIP for its detailed medical and surgical records and the excellent training provided to all key personnel. Within the Armed Forces Medical Examiner System, the Chief of the Mortality Surveillance Division received the prestigious Berry Prize in Federal Healthcare—the first time an AFIP staff member received this coveted award. And the DNA Identification Laboratory received a new, five-year accreditation from The American Society of Crime Laboratory Directors—Laboratory Accreditation Board (ASCLD-LAB). The ASCLD-LAB is the gold standard of accreditation for forensic laboratories around the world seeking the highest measure of quality laboratory work.

Beyond these recognitions for excellence, we continued building on programs initiated in 2007 while preparing for 2009. A significant upgrade for the Division of Molecular Pathology laboratory was completed, giving the Division the tools needed for providing prompt test results for clinical consultation services and developing new assays for the surgical pathology departments. And the Scientific Laboratories made tremendous progress in creating an Institute-wide research and development laboratory that is now exploring new procedures which will be developed in-house, validated and integrated into the diagnostic laboratories. These are focused on new prognostic markers for infectious disease. A total renovation of the Radiologic Pathology education facility was begun so the AFIP could continue to provide world-class education for the more than 500 radiologic pathology residency programs that rely on us. In the area of neuroscience, the AFIP is studying the effects of blast injuries on the brain by employing new scientific techniques in a laboratory with top instrumentation. And yes, we even took on the mission of helping educate military working dogs, with the Division of Forensic Toxicology taking on the task of providing drug training aids for this vital, DoD-wide program.

I'm proud to also report that the Institute—despite its uncertain future—continued to attract celebrated pathologists; one who returned to lead a traumatic brain injury project; another who returned to reestablish AFIP's all-important Division of Cardiovascular Pathology; and still another who joined the staff to head up the Division of Ophthalmic Pathology. Their interest in joining the staff is a testament to both their dedication and the Institute's continued ability to hire the best in the business.

That's quite a list of accomplishments. Despite the cloud of confusion and uncertainty, the stress and the strains—2008 was a year of important growth and advancement because we chose to persevere and to not let the future distract us from focusing on our missions. As we continue on into what is yet another year of demanding challenges—both known and unknown—we remain inspired by those who have gone before us and dedicated to those who rely on us for the world class consultation, education, and research they deserve.

A handwritten signature in black ink, appearing to read "Florabel G. Mullick".

Florabel G. Mullick, MD, ScD, FCAP  
Senior Executive Service  
The Director



## Executive Committee



Florabel G. Mullick, MD, ScD, FCAP  
Senior Executive Service  
The Director



**Robert D. Foss**  
CAPT, DC, USN  
Associate Director  
(Navy)



**Charles W. Pemble,  
Jr**  
Col, USAF, DC  
Deputy Director (Air  
Force)



**Christopher R.  
Owner, PhD**  
Director, Clinical Sci-  
ences



**James Affonco**  
Chief of Staff



**Sumitra Parekh**  
COL, MC, USA  
Director, Advanced  
Pathology



**Chanda Sutton**  
SFC, US Army  
First Sergeant



**James L. Staiger, MD**  
Director, Administra-  
tive Services



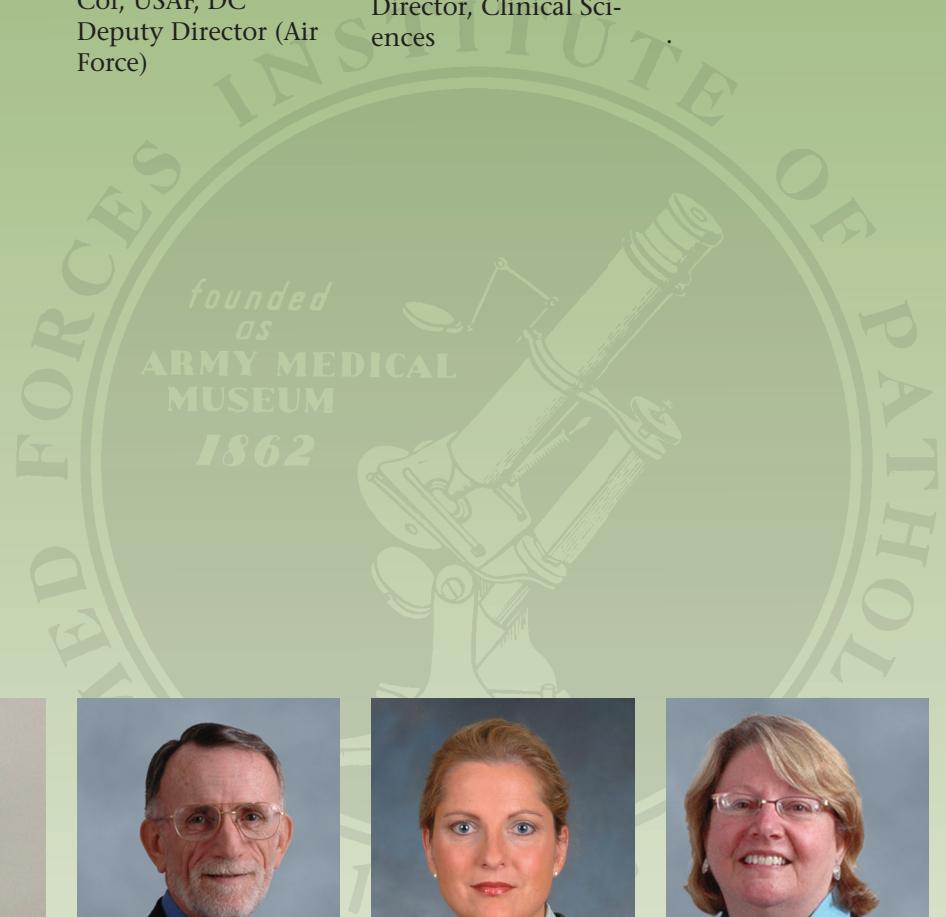
**Catherine M. With**  
JD, LLM, LLM, Major,  
USA  
Judge Advocate  
General's Corps; Legal  
Counsel



**Adriianne Noe, PhD**  
Director, National  
Museum of Health  
and Medicine



**Jo Lynne Raymond**  
COL, VC, USA  
Deputy Director  
(Army)



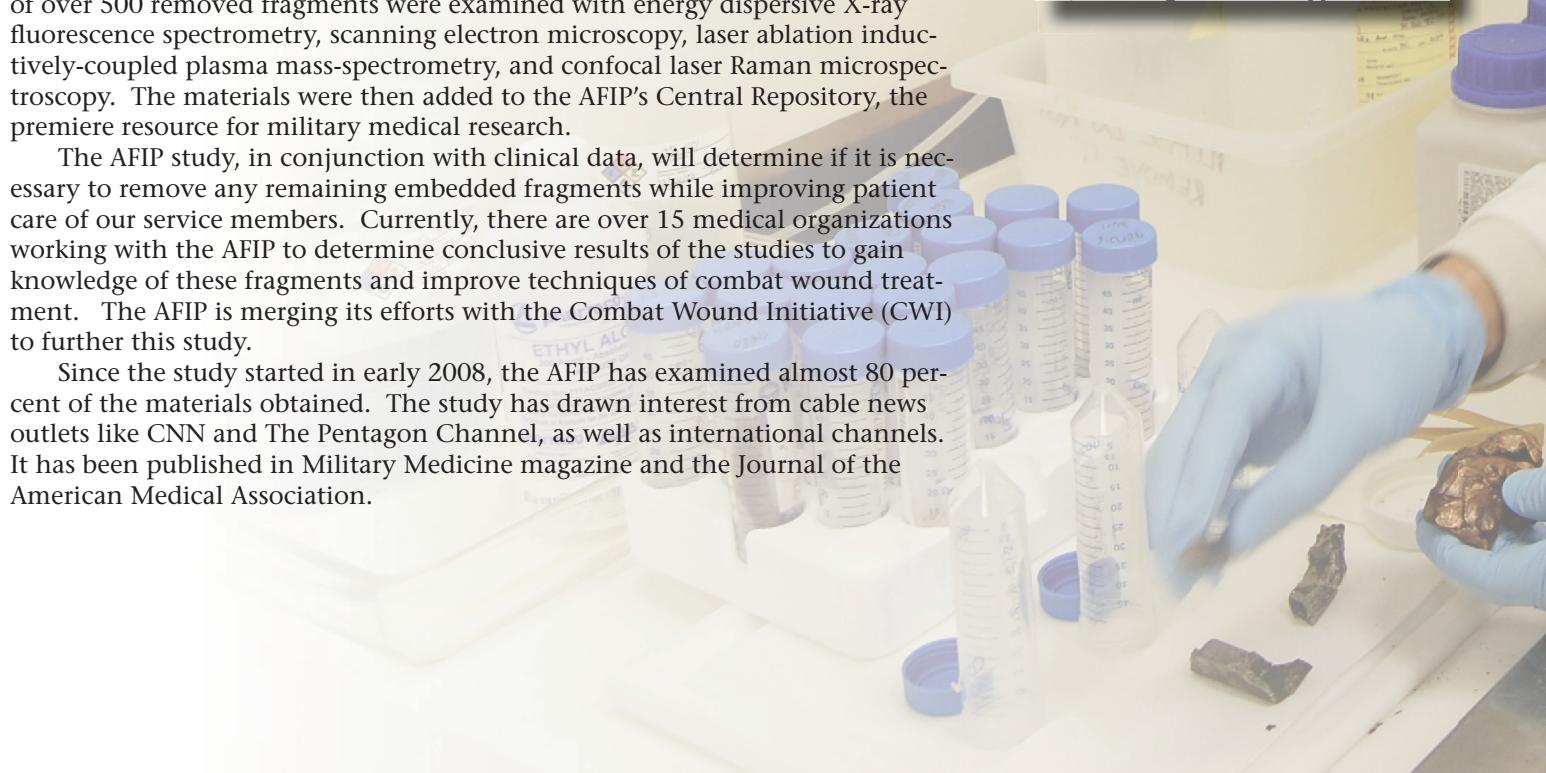
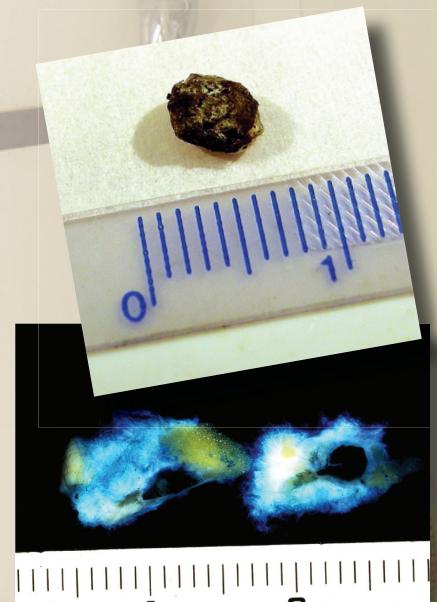
# AFIP Embarks on an Embedded Metal Fragment Registry

Improvised explosive devices (IEDs) can cause high-energy blast injuries on the battlefield. These injuries tend to be embedded with foreign materials of metallic or composite nature. To better serve wounded service members, the military medical system needs to know the health effects of these materials on the body. Sometimes, the risk of surgical removal of these fragments is higher than retaining them. The fragments can contain depleted uranium, tungsten, lead, and non-metal foreign bodies composed of natural and composite materials, though little is known about whether the fragments may release toxins into the body, or cause other diseases to develop. The U.S. Department of Health and Human Services instituted a policy requiring any and all foreign material removed from service members to be documented and thoroughly analyzed. The study was to be started by an institution with the best expertise, instrumentation, and a respected research background. With the new Embedded Metal Fragment Registry, the AFIP has been tasked with this assignment to acquire knowledge about these materials and discover their impact on the human body—results which could revolutionize the medical treatment of these types of wounds. By defining the chemical composition of these retained embedded fragments removed from injured service members, the AFIP can use the histological findings to direct medical treatment.

The Embedded Metal Fragment Registry investigates the short and long-term effects of metal fragments on the human body and the management of an archive of retained fragments. The AFIP is one of best equipped and experienced Department of Defense laboratories in biotoxicology studies, and is the only laboratory with an established registry. This means the study can span across a spectrum of specimens, including tissues and body fluids, and with the AFIP's modern instrumentation, detection of the components of these fragments is more sensitive. The surface, physical, and compositional properties of over 500 removed fragments were examined with energy dispersive X-ray fluorescence spectrometry, scanning electron microscopy, laser ablation inductively-coupled plasma mass-spectrometry, and confocal laser Raman microscopy. The materials were then added to the AFIP's Central Repository, the premiere resource for military medical research.

The AFIP study, in conjunction with clinical data, will determine if it is necessary to remove any remaining embedded fragments while improving patient care of our service members. Currently, there are over 15 medical organizations working with the AFIP to determine conclusive results of the studies to gain a knowledge of these fragments and improve techniques of combat wound treatment. The AFIP is merging its efforts with the Combat Wound Initiative (CWI) to further this study.

Since the study started in early 2008, the AFIP has examined almost 80 percent of the materials obtained. The study has drawn interest from cable news outlets like CNN and The Pentagon Channel, as well as international channels. It has been published in Military Medicine magazine and the Journal of the American Medical Association.





Critical discoveries for the DoD

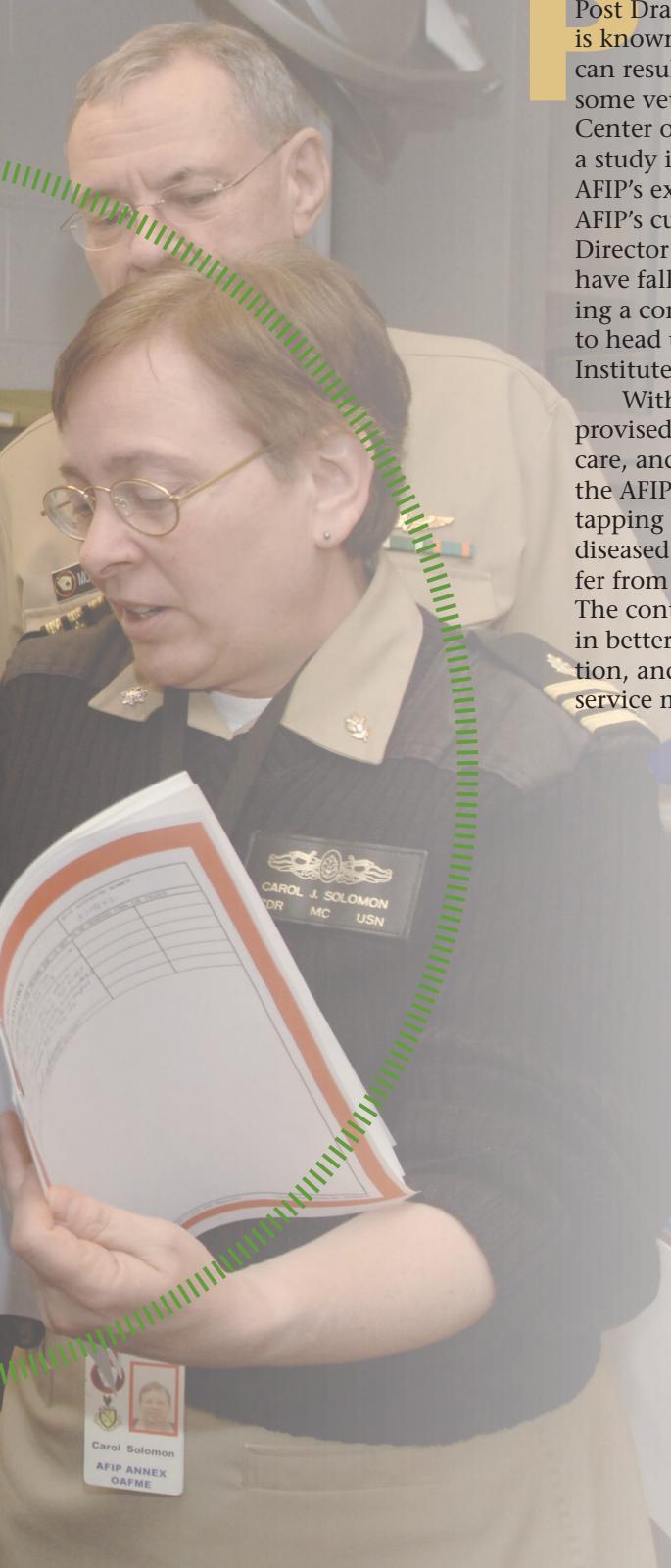
Work that makes a difference for  
the military medical community

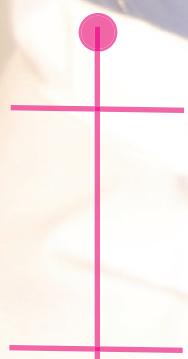


# The Department of Defense Estimates 360,000 Veterans May Have Brain Injuries

**P**ost Dramatic Stress Syndrome (PTSD) has been prevalent since WWI yet little is known about the direct cause, prevention, or treatment of the disease. PTSD can result from concussions, brain trauma, and mental disabilities, which causes some veterans unable to live fully functional lives. In conjunction with the Center of Excellence for Diffuse Head Injury under the Department of Defense, a study is looking into the correlation of blasts in the battlefield with PTSD, and AFIP's experienced research is providing comprehensive scientific analysis. The AFIP's current study on PTSD, led by Dr. Vernon Armbrustmacher, the former Director of the AFIP from 1991 to 1995, examines brain tissue from those who have fallen while serving in the military, looking for any subtle changes indicating a correlation to a blast. The retired Air Force colonel came back to the AFIP to head up this significant study, bringing his seasoned expertise back to the Institute.

With the number of service members wounded by roadside bombs and improvised weaponry, the AFIP's findings could result in revolutionized detection, care, and treatment of PTSD. Already having analyzed over 110 cases through the AFIP's Armed Forces Medical Examiner System, Dr. Armbrustmacher is tapping into the Central Registry for a thorough comparison of healthy and diseased brain tissue. 45,000 to 90,000 veterans, of the 360,000 estimated to suffer from brain injuries, have persisting symptoms and warrant specialized care. The continuation of AFIP's extensive and distinguished brain research will result in better protective wear for soldiers, better understanding of the PTSD condition, and a wealth of knowledge into medical issues afflicting thousands of our service members.





**Ground-breaking research**

**Helping our service members**



# Incorporation of FISH Technique in Laboratories Results in Deeper Analysis

In its mission to study complex cases and provide ground-breaking research to the DoD, every day AFIP pathologists are faced with challenging differential diagnoses. It is often difficult for pathologists to determine the type of tumor based solely on histology alone and there is a need for further tactical practices to reveal more about a case.

The incorporation of a new technique at the AFIP molecular laboratories resulted in research that provides more resources to the scientific community. Fluorescence In Situ Hybridization (FISH), activates fluorescently labeled DNA probes to hybridize target study areas, making the target areas more easily viewed for better analysis of the tissue. The upgraded instrumentation allows the AFIP to continue to provide exceptional research.

FISH is used to look at a variety of genes, translocations, and ploidy. The results can be correlated with clinical and pathological parameters while retaining morphology. The technique is a benefit in the analysis of gliomas by using genetic testing in the prognosis and diagnosis of brain tumors. The molecular lab can study tumors more efficiently, and can provide more thorough analysis.

What makes FISH particularly useful is its detection of infiltrating tumor cells in the presence of contaminated cells—a distinction undetected by older tactics. The FISH results are rapid, with many results obtained within 3 days, allowing for optimal treatment decisions in a timely manner.



# Defense and Veterans Brain Injury Center Uses the AFIP for Outstanding Research

The Defense and Veterans Brain Injury Center, an independent agency at Walter Reed Army Medical Center since 1992, conducts research into the many faceted aspects of brain trauma, an injury afflicting thousands of our troops. To more thoroughly understand these injuries and improve rehabilitation of Traumatic Brain Injury (TBI) victims, the Center approached the AFIP, an institute known for its notable research, to lead a study to investigate the effects of explosive blasts on the brain.

Looking into the neuroscience behind the effects of a blast, AFIP is employing new scientific techniques in a laboratory with top instrumentation. With two specialized, technologically-advanced pieces of MRI equipment available, and a third coming in 2009, the AFIP can efficiently analyze brain tissue and model systems to learn about this debilitating injury. Dr. Kimberlee Potter is also employing a new technique in the analysis of tissue. Coherent Anti Stokes Raman Scattering (CARS) employs multiple photons to address the molecular vibrations in tissue then produces a signal in which the emitted waves are coherent with one another. The optical method has a much stronger magnitude. The study is adding to the Central Repository with a new collection of brain injury cases, bettering clinical evaluation and follow-up.

The combination of the incorporated CARS technique with the modern MRI machinery is providing complimentary information about each specimen analyzed, and furthering the Institute's commitment to continue exceptional research.

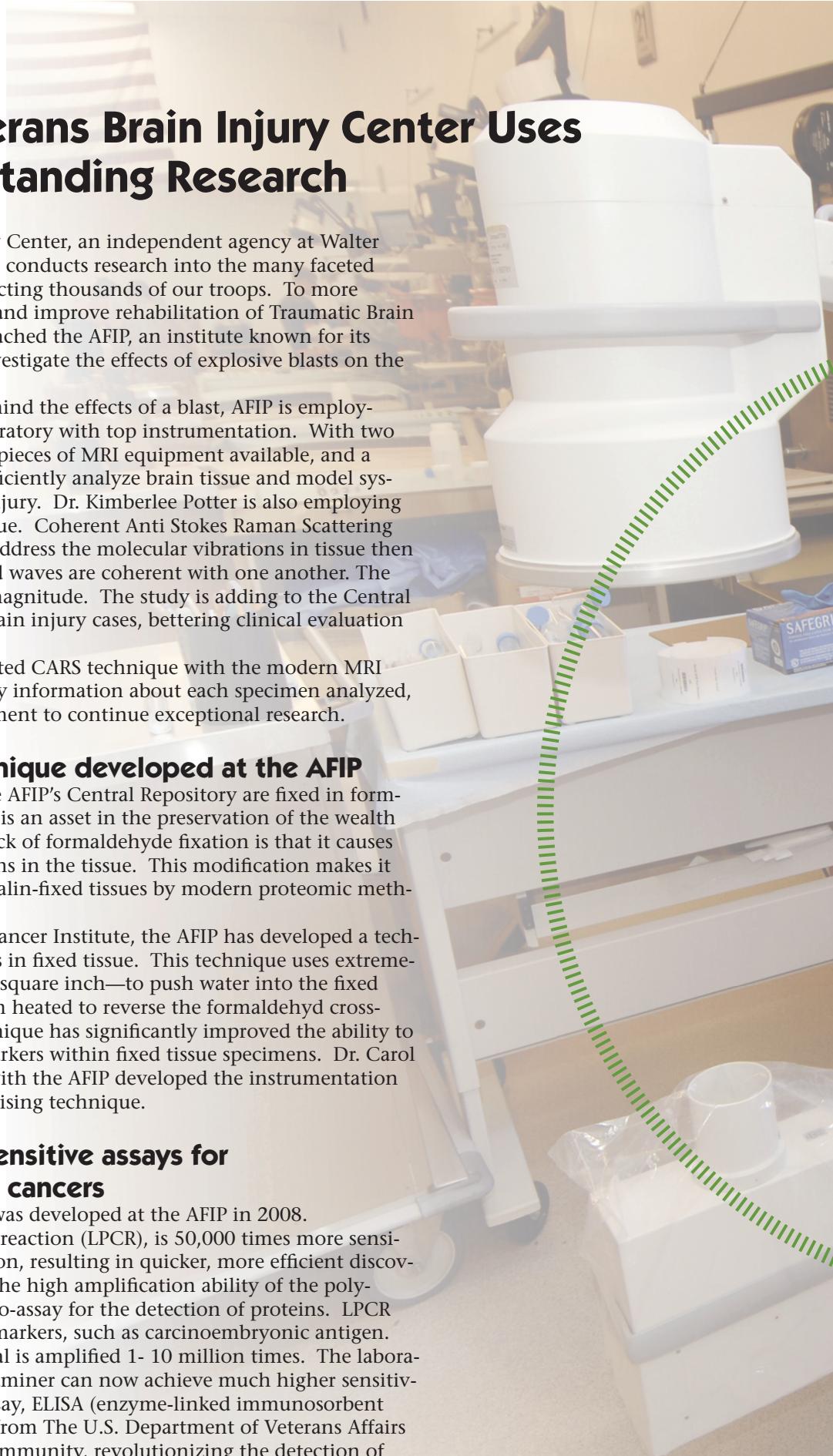
## New protein recovery technique developed at the AFIP

Millions of tissue samples stored at the AFIP's Central Repository are fixed in formaldehyde solution. While the solution is an asset in the preservation of the wealth of cases in the Repository, one drawback of formaldehyde fixation is that it causes cross-links to form between the proteins in the tissue. This modification makes it harder to analyze the proteins in formalin-fixed tissues by modern proteomic methods.

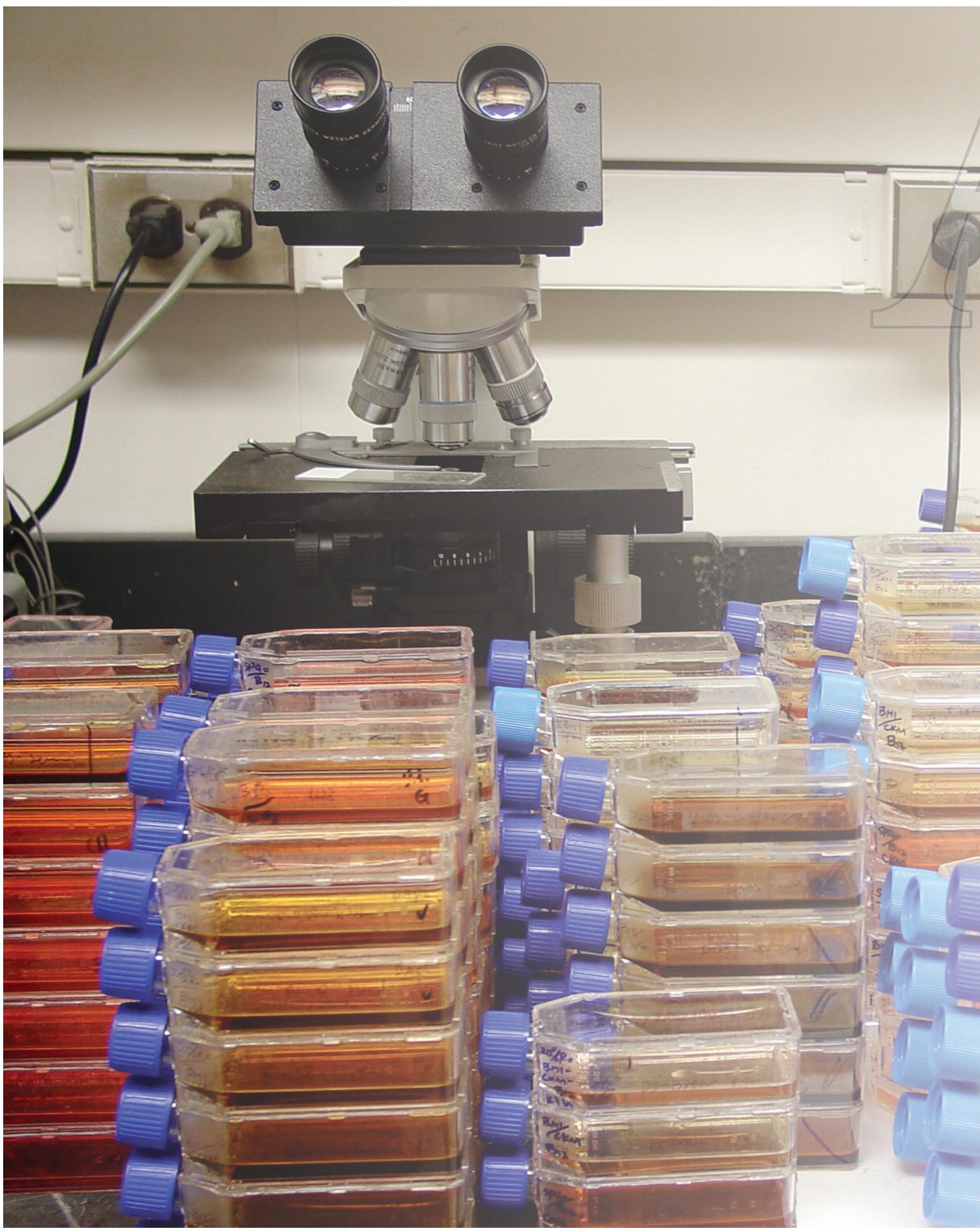
With support from the National Cancer Institute, the AFIP has developed a technique to reverse the protein cross-links in fixed tissue. This technique uses extremely high pressure—up to 60,000 lbs per square inch—to push water into the fixed sample. The rehydrated sample is then heated to reverse the formaldehyd cross-links in the hydrated tissue. This technique has significantly improved the ability to apply proteomics in looking for biomarkers within fixed tissue specimens. Dr. Carol Fowler and Mr. Robert Cunningham with the AFIP developed the instrumentation and methods used in this highly promising technique.

## The AFIP develops highly sensitive assays for detection of biotoxins and cancers

The most sensitive assay in existence was developed at the AFIP in 2008. The assay, liposome polymerase chain reaction (LPCR), is 50,000 times more sensitive than the current modes of detection, resulting in quicker, more efficient discovery of biomarkers. The assay couples the high amplification ability of the polymerase chain reaction with an immuno-assay for the detection of proteins. LPCR can also find formerly undetected biomarkers, such as carcinoembryonic antigen. With this method, the detectable signal is amplified 1- 10 million times. The laboratories at the Armed Forces Medical Examiner can now achieve much higher sensitivity than the conventional immuno-assay, ELISA (enzyme-linked immunosorbent assay). AFIP will soon receive a grant from The U.S. Department of Veterans Affairs to provide this assay to the medical community, revolutionizing the detection of biomarkers in biotoxins and cancers.







# The AFIP's Departments of Pathology Provide Diagnostic Answers

All 23 departments at the AFIP continue to provide unprecedented consultation and research for the military, academia, government institutions and commercial markets. In 2008, all department projects enhanced the AFIP's status as a premier resource for the military and civilian medical communities.

- The Department of Hepatic and Gastrointestinal Pathology participated in multicenter clinical trials sponsored by NIH and pharmaceutical companies, leading to fruitful collaborations and publications.
- The Department of Pulmonary and Mediastinal Pathology worked with world-class thoracic radiologists and pulmonologists to provide complete clinical, pathologic and radiologic consultation opinions. Over 1,750 cases were completed, and the Department's skilled staff held 11 presentations and seminars.
- The Department of Hematopathology completed almost 2,000 cases for the Department of Defense, Veterans Affairs, and civilian hospitals worldwide.
- The Department of Dermopathology reviewed over 6,800 cases, mainly submitted by military and federal institutions. Consultation led to a changed diagnosis in 144 cases, which greatly changed the treatment outcome, improved patient care and potentially saved millions of dollars in medical malpractice suits.
- Members of the Department of Oral and Maxillofacial Pathology deployed on Operation Iraqi Freedom forensic missions supporting the AFIP's Armed Forces Medical Examiner by accurately identifying disaster victims.
- The Department of Gynecologic and Breast Pathology participated in the College of American Pathologists Inter-Laboratory Proficiency Comparison Program Exercises in Gynecologic and Non-Gynecologic Cytopathology, and also passed the federally mandated Gynecologic Cytopathology Proficiency Test with a score of 100 percent.
- The Department of Endocrine and Otorhinolaryngic/Head-Neck Pathology completed 1,660 cases, dealing with a broad spectrum of pathologic conditions, consisting of a multitude of disease entities affecting the upper respiratory tract, ear, and adjacent or related anatomic areas of the head and neck, and diseases of the pancreas, adrenal, thyroid and parathyroid glands.
- The Department of Soft Tissue and Orthopedic Pathology provided *in situ* hybridization for gene rearrangement analysis for sarcoma typing, and KIT and PDGFRA mutation analyses for gastrointestinal stromal tumor therapy optimization.
- The Department of Genitourinary and Nephropathology Pathology collaborated with the Center for Prostate Disease Research on gene expression profiling in formalin-fixed paraffin-embedded specimens. This methodology will greatly enhance the utilization of specimens representing malignant and nonmalignant diseases of the genitourinary tract.



**Tissue Microarray**

**Research that makes a difference**



# AFIP Establishes New Collaborations in 2008

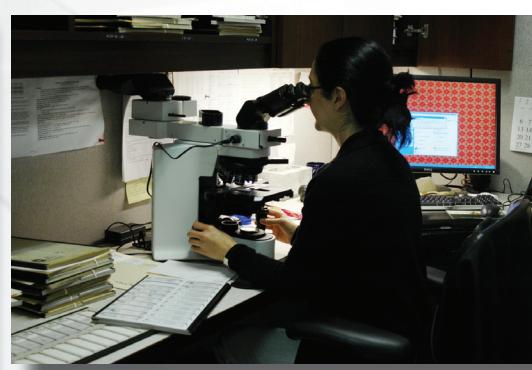
In 2008, the AFIP formed new partnerships with military institutions, private companies, national organizations, and academia to work on significant projects in the medical community by providing research that supports the DoD. With new Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD) programs, the AFIP and Johns Hopkins University professor Dr. Juan C. Troncoso of the Troncoso Hopkins TBI Research Consortium, submitted proposals for a study that would look into the neuropathology of blast injury and ensuing neurodegeneration in the human brain. The AFIP and the Uniformed Services University of the Health Sciences proposed a study to investigate the dimerization of angiotensin II, serotonin, and CRH receptors in PTSD. The AFIP, along with the Veterans Affairs, the Massachusetts Institute of Technology, the National Institute of Health, and the DARPA Consortium, proposed a study that would isolate shock waves on central nervous system injuries.

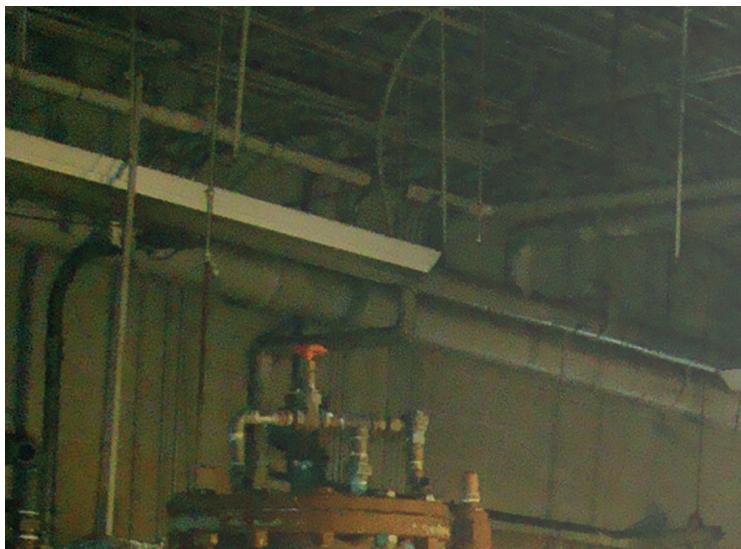
In a venture with the University of Hawaii, the AFIP looked into the differential expression of gene coding for anxiety-related neuropeptides and their receptor variants in PTSD. Calibrant, a private proteomics company that specializes in laser microdissection of tissue on slides, enlisted the help of the AFIP to produce standard and custom tissue microarrays in the area of brain cancer, with the goal of identifying predictive markers for personalized medicine.

The collaborations continued with Genetics Squared, a computer software company that developed a genetic programming analytic platform which can identify 'key tumor genes' on which to focus subsequent generation of candidate molecular classifiers. The upcoming project with Genetics Squared is to look into the development of a prognostic test for early-stage colorectal cancer.

With these new projects, the AFIP is making an impact on the global medical community. The AFIP looks forward to future collaborations and furthering its celebrated research and consultation services.

**With these new projects, the AFIP is making an impact on the global medical community. The institute looks forward to future collaborations that will further the AFIP's celebrated research and consultation.**





# New Developments at the AFIP's Clinical Sciences Directorate

The Directorate of Clinical Sciences houses a premier collection of specimens, available to the DoD, which furthers biomedical research for the military medical community. In 2008, a series of new developments made the collection even more of a significant resource.

New protein recovery technique developed at the AFIP Millions of tissue samples stored at the AFIP's Central Repository are fixed in formaldehyde solution. While this fixation is an asset in the preservation of the wealth of cases in the Repository, one drawback of formaldehyde fixation is that it causes cross-links to form between the proteins in the tissue. This modification makes it much harder to analyze the proteins in formalin-fixed tissues by modern proteomic methods.

With support from the National Cancer Institute, the AFIP has developed a technique to reverse the protein cross-links in fixed tissue. This technique uses extremely high pressure – up to 60,000 lbs per square inch – to push water into the fixed sample. The re-hydrated sample is then heated to reverse the formaldehyde cross-links in the hydrated tissue. This technique has significantly improved the ability to apply proteomics in looking for biomarkers within fixed tissue specimens. Dr. Carol Fowler and Mr. Robert Cunningham with the AFIP developed the instrumentation and methods used in this highly promising technique.

## Addition of 3rd Vertical Lift System

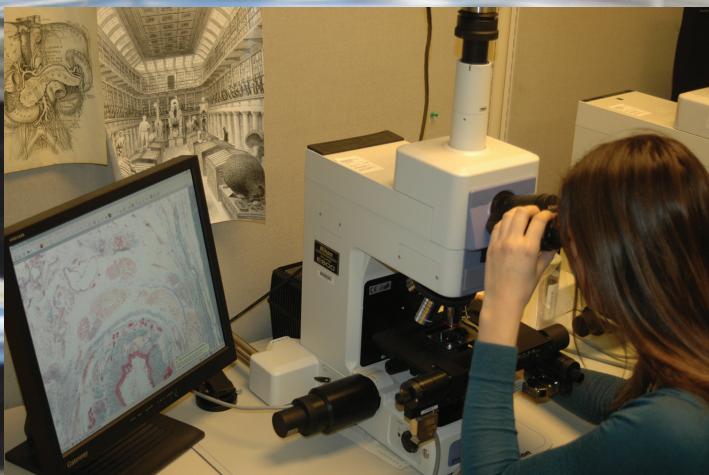
The AFIP's Central Repository installed new machinery in Building 606 as part of a major ongoing renovation. Frank Roberts, Associate Chair, Department of Repository Services, helped design and oversee installation of a third vertical lift system, enabling efficient retrieval of standard and uniquely-sized glass slides. The new instrumentation is a revolutionary concept in the storage of any variation of slides. The Central Repository incorporated the unique technology to accommodate the addition of thousands of new case slides to the Repository's vast wealth of material.

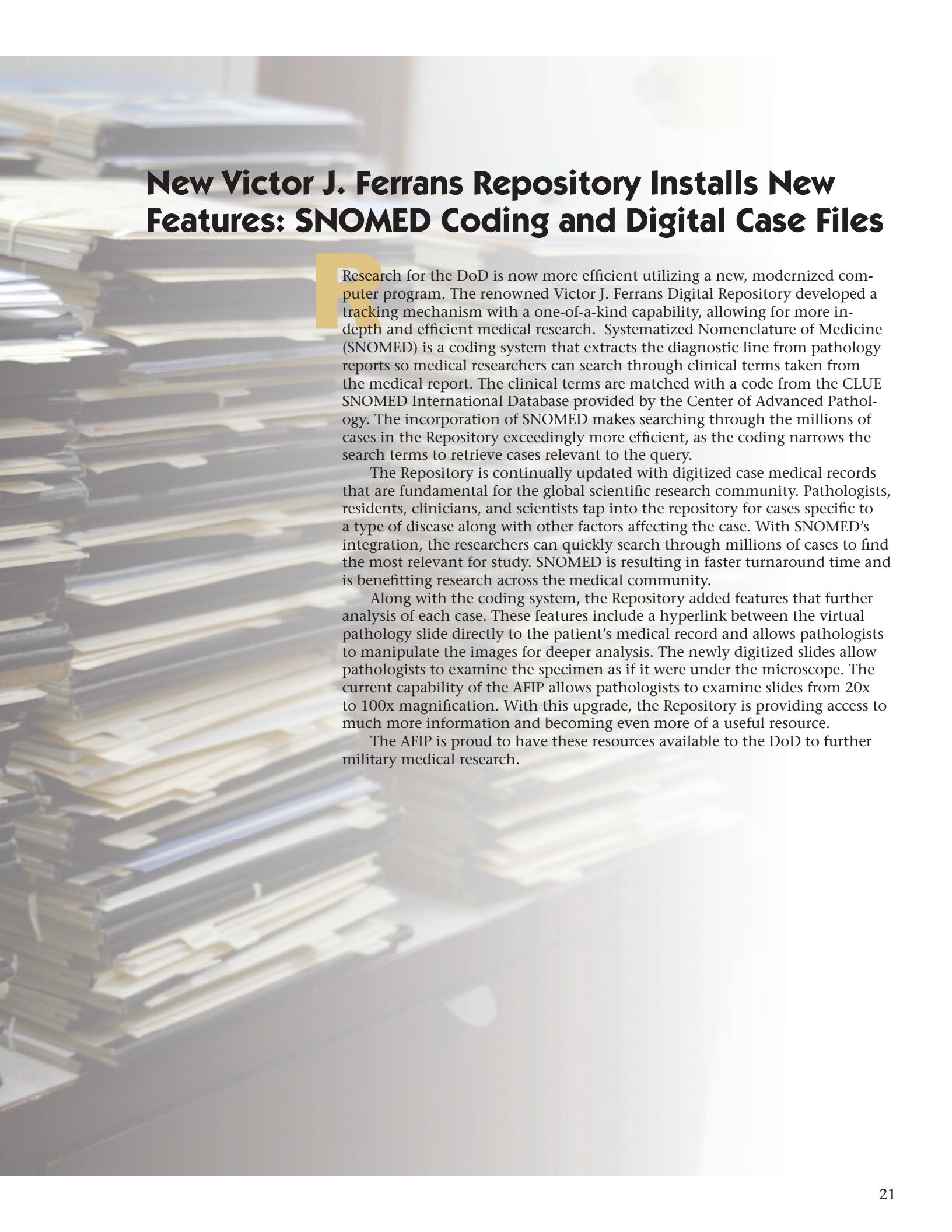
When retrieving a sample, the technologically-advanced trays in the Vertical Lift Machine adjust to a slide of any size, a function never before incorporated in case storage. The machine operates through a custom-designed software system holding a database of accession numbers. "Operators can type in the accession number and within minutes the slide is retrieved," said Roberts. The AFIP is the only laboratory in the world that uses an automatic robotic system for slide storage.

## Building 606 starts complete renovation

The facility that holds millions of slides for the AFIP's Central Repository began a massive renovation in 2008. The upgrade includes installation of new storage space, modernized technology, and office space, among other improvements. Once completed, the building will archive and store most of the Central Repository's paraffin-embedded block materials, which includes millions of standard and variably sized slides available for study by the worldwide medical community.







## New Victor J. Ferrans Repository Installs New Features: SNOMED Coding and Digital Case Files

Research for the DoD is now more efficient utilizing a new, modernized computer program. The renowned Victor J. Ferrans Digital Repository developed a tracking mechanism with a one-of-a-kind capability, allowing for more in-depth and efficient medical research. Systematized Nomenclature of Medicine (SNOMED) is a coding system that extracts the diagnostic line from pathology reports so medical researchers can search through clinical terms taken from the medical report. The clinical terms are matched with a code from the CLUE SNOMED International Database provided by the Center of Advanced Pathology. The incorporation of SNOMED makes searching through the millions of cases in the Repository exceedingly more efficient, as the coding narrows the search terms to retrieve cases relevant to the query.

The Repository is continually updated with digitized case medical records that are fundamental for the global scientific research community. Pathologists, residents, clinicians, and scientists tap into the repository for cases specific to a type of disease along with other factors affecting the case. With SNOMED's integration, the researchers can quickly search through millions of cases to find the most relevant for study. SNOMED is resulting in faster turnaround time and is benefitting research across the medical community.

Along with the coding system, the Repository added features that further analysis of each case. These features include a hyperlink between the virtual pathology slide directly to the patient's medical record and allows pathologists to manipulate the images for deeper analysis. The newly digitized slides allow pathologists to examine the specimen as if it were under the microscope. The current capability of the AFIP allows pathologists to examine slides from 20x to 100x magnification. With this upgrade, the Repository is providing access to much more information and becoming even more of a useful resource.

The AFIP is proud to have these resources available to the DoD to further military medical research.

# AFIP's Department of Medical Education Making Strides in 2008

The Department of Medical Education is celebrating its one-year anniversary of receiving a rare achievement that confirms the AFIP as a valued resource for medical education: a 6-year accreditation from the Accreditation Council for Continuing Medical Education. The Department has debuted three innovative courses, bridged new relationships with educational partners, and received endorsement from national organizations. With a reputation for having an in-depth curriculum of courses, the AFIP's educational offerings have become essential for clinicians, legal medicine professionals, veterinary pathologists, radiologists, dentists, forensic anthropologists, and residents. The Department's schedule in 2008 included 28 live courses, 51 Regularly Scheduled Series, Ground Rounds Video teleconferences [VTC], Weekly Professional Staff Conferences and Callender-Binford Lectures, 6 web-based courses, and 1 Enduring Material Open File Legal Medicine.

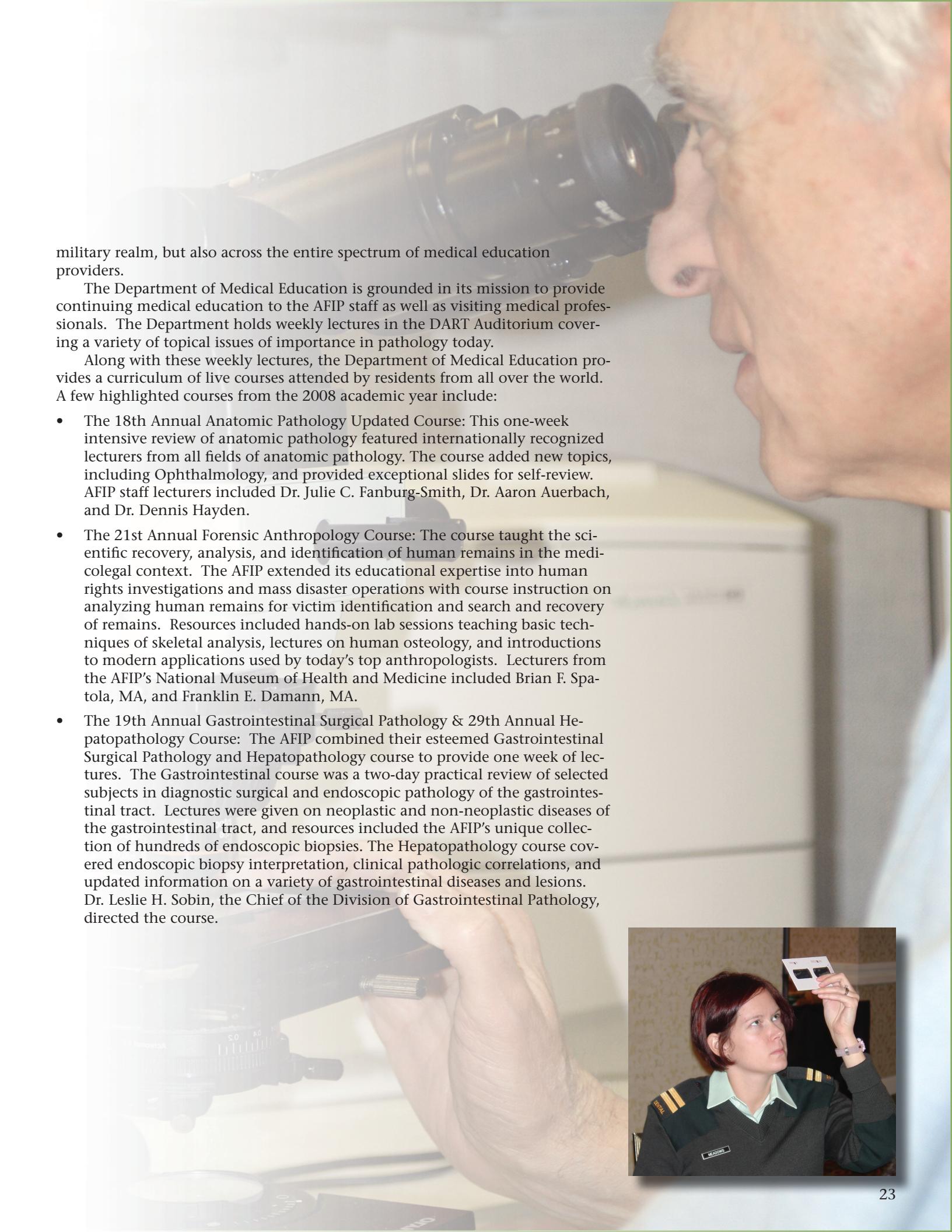
The Department is branching out further into forensic science to prepare pathologists for potentially catastrophic events. Led by the curator of anatomic collections of AFIP's National Museum of Health and Medicine, Franklin Dannann, the Forensic Bone Histology course taught how to establish a biological profile through macroscopic indicators in times of mass fatality incidents such as acts of terrorism and transit accidents. The new course showed students how to differentiate human from nonhuman bone fragments, estimate age-at-death, and evaluate biasing factors of bone microstructure.

In 2008, the Department's courses received backing from national organizations. The American Board of Forensic Odontology, an association that aims to establish, enhance, and revise standards of qualifications for those who practice forensic odontology, endorsed the AFIP's highly valued Forensic Dental Identification and Emerging Technologies course. This support from a prestigious organization is proof that the AFIP's Department of Medical Education continues to enhance its status as a trusted resource for vital medical instruction.

Other ventures in 2008 fell under the AFIP's outreach endeavors. The Department supported a free Sexual Assault Response Training course at Andrews Air Force Base in Maryland. In December, COL Glenn Sandberg, a pathologist at the AFIP, collaborated with Louisiana State University to bring the AFIP's Neuropathology Review to New Orleans, a region that has limited access to continuing medical education courses since Hurricane Katrina. The city's medical system has not fully recovered from the hurricane, resulting in very limited opportunities for residents to take Continuing Medical Education courses. The AFIP's Department of Neuropathology held a free, one-day condensed version of the Neuropathology Review for 70 New Orleans area physicians, funded by the local branch of TEVA Pharmaceuticals. The project was developed through the collaborative efforts of Dr. Sandberg, Dr. Bette Kleinschmidt-DeMasters, Professor of Pathology, Neurology, and Neurosurgery at the University of Colorado at Denver, and Dr. John England, Professor and Chairman of the Department of Neurology at Louisiana State University. The course offered top names in neuropathology from the AFIP and other prominent medical organizations. Having little access to continuing medical education courses, the 70 physicians eagerly attended the course taught by top sub-specialists from the AFIP and other esteemed institutions.

By collaborating with private medical companies, the AFIP is expanding its coursework to provide even more world-class pathology education. These collaborations place the AFIP at the forefront of medical education, not just in the





military realm, but also across the entire spectrum of medical education providers.

The Department of Medical Education is grounded in its mission to provide continuing medical education to the AFIP staff as well as visiting medical professionals. The Department holds weekly lectures in the DART Auditorium covering a variety of topical issues of importance in pathology today.

Along with these weekly lectures, the Department of Medical Education provides a curriculum of live courses attended by residents from all over the world. A few highlighted courses from the 2008 academic year include:

- The 18th Annual Anatomic Pathology Updated Course: This one-week intensive review of anatomic pathology featured internationally recognized lecturers from all fields of anatomic pathology. The course added new topics, including Ophthalmology, and provided exceptional slides for self-review. AFIP staff lecturers included Dr. Julie C. Fanburg-Smith, Dr. Aaron Auerbach, and Dr. Dennis Hayden.
- The 21st Annual Forensic Anthropology Course: The course taught the scientific recovery, analysis, and identification of human remains in the medi-colegal context. The AFIP extended its educational expertise into human rights investigations and mass disaster operations with course instruction on analyzing human remains for victim identification and search and recovery of remains. Resources included hands-on lab sessions teaching basic techniques of skeletal analysis, lectures on human osteology, and introductions to modern applications used by today's top anthropologists. Lecturers from the AFIP's National Museum of Health and Medicine included Brian F. Spatola, MA, and Franklin E. Damann, MA.
- The 19th Annual Gastrointestinal Surgical Pathology & 29th Annual Hepatopathology Course: The AFIP combined their esteemed Gastrointestinal Surgical Pathology and Hepatopathology course to provide one week of lectures. The Gastrointestinal course was a two-day practical review of selected subjects in diagnostic surgical and endoscopic pathology of the gastrointestinal tract. Lectures were given on neoplastic and non-neoplastic diseases of the gastrointestinal tract, and resources included the AFIP's unique collection of hundreds of endoscopic biopsies. The Hepatopathology course covered endoscopic biopsy interpretation, clinical pathologic correlations, and updated information on a variety of gastrointestinal diseases and lesions. Dr. Leslie H. Sabin, the Chief of the Division of Gastrointestinal Pathology, directed the course.





## New Improvements to AskAFIP™ in 2008

AskAFIP™ is becoming a more comprehensive, resourceful, and efficient tool for military medicine. The online educational resource is being upgraded through the efforts of the AskAFIP™ Steering Committee to begin the ongoing integration of over 600,000 Radiopathology cases into the website's impressive collection of pathology cases. With this project, AskAFIP™ will be not just a valued and significant resource for pathology education, but for radiology students and other medical personnel as well. Previously, the AFIP's Department of Radiologic Pathology was using a limited application to hold their cases. Now, with this incorporation of radiologic cases, students can access a well-run, accessible portal for their educational needs. "This is a tremendous opportunity for Radiology because AskAFIP™ is already well-established," said Navy Cmdr. William Craig, Chair, Department of Radiologic Pathology. "We have done a top-to-bottom review and AskAFIP™ is about 85 percent complete when it comes to the Radiology resources. The hard work has already been done." Out of the thousands of cases, currently more than half of those files have been digitized and added to the AskAFIP™ website.

Dr. Teri Franks, Chairman, Department of Pulmonary and Mediastinal Pathology and Dr. Jeffrey Galvin, AFIP Radiologist, launched the

AskAFIP™ in 2002. Interactive features of AskAFIP™ include online chats and discussion, access to fascicles, both common and rare cases, and a variety of educational materials and tools.

Once the radiology archives have been added, visitors to AskAFIP™ will be able to engage in dialogue about cases directly with the radiologists and pathologists. "Collaboration between radiologists and pathologists is becoming more common and is part of a movement in medicine," said Craig. "Dr. Franks is a premier pathologist, and she will be able to share her thoughts with the group (during lectures) about why she decided to go with a particular diagnosis or why she did not," he said. "It's tremendously valuable. More collaboration among caregivers is needed because patient diagnoses are much more complicated. Patients now often have multiple underlying diseases."

The integration will make the online asset truly a one-of-a-kind gateway to a wealth of pathology knowledge. "The radiology and pathology clinicians are large stakeholders," said Chris Owner, PhD, Director of Clinical Sciences. "Both of these groups have a vested interest in the Institute and what we do. We are unique because we are combining two disciplines into our own point of care." The project will allow for more interaction between the medical fields. "The AFIP is a unique organization in that it gives radiologists the ability to consult with pathologists, and the chance to review cases offers a tremendous learning opportunity," Craig said. "Between the radiologist and the pathologist there is a tremendous amount of knowledge, and the way to expound on that knowledge is through interaction." Radiology cases presented will include slides, images, radiographs, diagrams, and pictures.

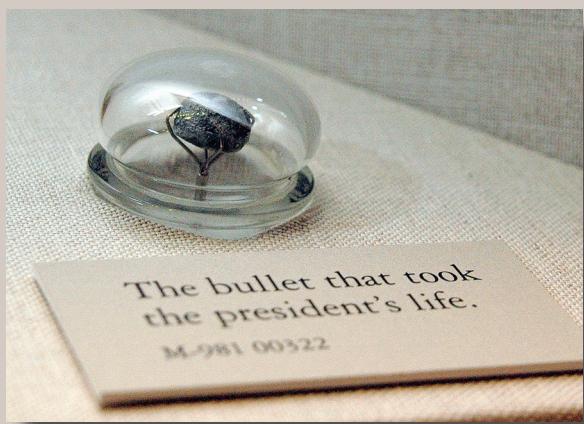
AskAFIP™ will soon become complete with the entire Radiology archive. Medical education courses will be available through AskAFIP™ by September 2010, including online chats and discussion. The new interactive website will become a key benefit to the residents attending the AFIP Radiology Course. "We are trying to capture that knowledge and expose the medical community to it," said Craig. "And part of it is simply going to be capturing the conversations—that correlative experience, so people can actually listen to the interplay between the radiologist and pathologist." The AFIP is excited about this project that will make the Institute even more of an asset to the medical community.



## "Abraham Lincoln: The Final Casualty of the War"

As 2008 came to a close, the National Museum of Health and Medicine/AFIP was putting the finishing touches on "Abraham Lincoln: The Final Casualty of the War," a new exhibition to celebrate the bicentennial of Lincoln's birth. "Final Casualty" honors AFIP's founders as the exhibit presents rarely-seen autopsy reports and letters from Army Medical Museum personnel who played critical roles in the hours after the assassination. ("Final Casualty" opened on February 12, 2009.)

"President Lincoln's legacies will be celebrated across the nation in 2009, and here at the Museum, we offer an everyday reminders of his presidency and his mortality," said Adrienne Noe, Ph.D., the Museum's director. "It was during Lincoln's presidency that the Army surgeon general established the Army Medical Museum in 1862. Just three years later, Museum staff played a vital role in treating the president and preserving the record of his death. Army Medical Museum staff assembled these one-of-a-kind objects for study and exhibition, so that future generations would be able to understand, from the point of view of these few men in 1865, their role in one of the most important moments in our nation's history. Preserving these artifacts and safeguarding them for future generations is part of the public trust central to the mission of this Museum."





## "RESOLVED: Advances in Forensic Identification of U.S. War Dead"

In 2008, NMHM/AFIP opened a dynamic new exhibition that features case studies and artifacts representing several key AFIP divisions, including the Armed Forces DNA Identification Laboratory and the Office of the Armed Forces Medical Examiner. "RESOLVED: Advances in Forensic Identification of U.S. War Dead" highlights the underlying forensic sciences that have evolved to fulfill our nation's commitment to the identification of U.S. service members who have made the ultimate sacrifice.

RESOLVED offers NMHM visitors a rare glimpse inside the activities of the OAFME at the Dover Port Mortuary. An exhibit case includes autopsy tools used at Dover after the September 11, 2001 attacks at the Pentagon and a multimedia presentation explores the innovative use of 'virtual autopsies' performed on human remains once they reach Dover.

A case study presented in the RESOLVED exhibit features one of the key milestones in the history of forensic identification. DNA analysis provided by the Armed Forces DNA Identification Laboratory (AFDIL) was critical to the positive identification of U.S. Air Force pilot Michael Blassie, the Vietnam Unknown Soldier identified in 1998.

"We take it for granted today – that those who make the ultimate sacrifice for their country will be quickly returned to their loved ones," said Franklin Dammann, curator of the Museum's Anatomical Collections and lead curator for RESOLVED. "That was not always the case, and the development of new technologies, policies and even professions such as forensic anthropology, has been driven by our armed forces as far back as the American Civil War."



# DNA Identification Laboratory Receives Five-Year Accreditation

The American Society of Crime Laboratory Directors (ASCLD) awarded the Armed Forces DNA Identification Laboratory a highly regarded five-year accreditation. The inspection by auditors from the ASCLD involved extensive audits of laboratory performance and procedures, personnel qualifications, validation studies, case work, safety and security procedures, and proficiency and training records. "This is a great reflection on the technical leaders and the whole staff in making sure that we maintain such a high level of work," said Lt. Col. Louis Finelli, the Chief Deputy Medical Examiner and the Director of the Department of Defense DNA Registry. The DNA Identification Laboratory is one of only three DoD accredited labs that performs DNA studies, and has significant impact on military wartime operations.

More than 120 scientists, researchers, DNA analysts, technicians and other staff personnel make up the Armed Forces DNA Identification Laboratory and the DNA Repository, and their efforts have led to continued successful consultation and research. Dr. Michael Coble, research section chief, led a team that positively identified the last two previously unidentified children of Nicholas II, Russia's last czar. "He put AFDIL on the map as being in the forefront of forensic DNA testing," Finelli said. The Nuclear DNA Section completed a substantial number of reports while maintaining support for the Laboratory operations. Suzanne Barritt-Ross, Technical Leader for the mtNDA Section, worked with more than 800 samples and over 1,200 family references in support of the Joint Prisoners of War – Missing in Action Accounting Command. In addition, the DNA Repository staff, led by Director of Operations Larry Drayton, processed over 293,000 DNA reference cards.

The five-year accreditation awards the hard work of the AFIP's Armed Forces DNA Identification Laboratory in 2008 for playing a major role in the Department of Defense.



## AFIP Lends Their Expertise in Intricate Identification Case

After human remains were discovered in Puerto Rico, the AFIP was called for assistance in a complex identification case. MAJ Laura Regan, the Deputy Chief Forensic Anthropologist of the AFIP's Armed Forces Medical Examiner, traveled to Puerto Rico to work on identification of a civilian victim found on federal land. Regan worked with the National Transportation and Safety Board and the FBI to uncover details about the victim, the cause of death, and provide answers to family members.

Having a post doctorate in physical and forensic anthropology from the University of Florida, Regan has been a prominent figure within the AFIP since she joined the Armed Forces Medical Examiner staff two years ago. She is the first active duty military member to be trained as a forensic anthropologist – a profession that creates biological profiles of unknown individuals based on their skeletons, and searches for attributes on sex, race, and ancestry.

When she arrived in Puerto Rico, she saw that the identification project was going to be difficult. "There was severe trauma to the body. In a jungle environment even the bones degraded quickly," she said. "I did the skeletal analysis and we were able to establish positive identification on him even though the remains were badly fragmented and incomplete." Regan successfully identified the victim to be a doctor killed in a private aircraft crash four years ago. Explosive disposal personnel training in Puerto Rico found a tail number on the aircraft and matched it to the doctor's plane. Combined with analysis of the victim's dental work, the match was made, and the family informed.

The Deputy Chief's work on this case is a demonstration of the skilled AFIP staff's continual and significant consultation to the worldwide medical community



# New Chief Takes Over Mortality Surveillance

With an accomplished career that spans across a spectrum of medical fields, Navy Capt. Joyce Lapa was named the new Chief of the Mortality Surveillance Division for the Armed Forces Medical Examiner System (AFMES) in October. "I'm proud to take over the Division. Cmdr. Pearse has done an incredible job," Lapa said.

Lapa first encountered the AFIP during her first year of pathology residency at the National Naval Medical Center. She attended the AFIP Basic Forensic Pathology course and met Capt. Glenn Wagner with the AFIP AEMES. Lapa was invited to assist with death investigations at the Dover Port Mortuary for two weeks in the wake of the SCUD Missile attack during the Gulf War. This experience changed her career. "It confirmed to me that this is what I was going to do," Lapa said. The experienced Navy captain then took her expertise abroad, serving as the Laboratory Department Head and Regional Medical Examiner in Okinawa, Japan. She then decided to pursue preventative medicine, and started work at the Naval Medical Research Center as a clinical investigator in enteric vaccine research. Lapa was transferred to AFMES following Cmdr. Pearse's departure.

"This is a great job for me, combining both of my specialties and working with the AFMES medical examiners," Lapa said. The Division's analysis of data collected in the surveillance system have allowed the staff to point out patterns in causes of death that have led to numerous policy changes related to protective military equipment, combat casualty care, and vehicles in the battlefield.



# AFIP Division Chief Awarded Prestigious Berry Prize

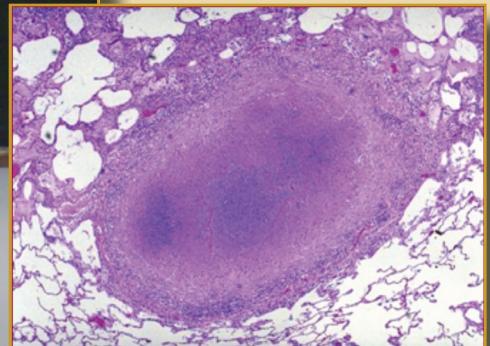


The Frank Brown Berry Prize recognizes a federal medical provider for rising above the call of duty to make a significant contribution to medicine. In August, the prize was awarded to Cmdr. Lisa Pearse, the former Chief Deputy Armed Forces Medical Examiner (AFMES) and Chief of the Mortality Surveillance Division. Pearse has been a significant leader in the AEMES, growing the division by tenfold and paving the way for the division to promote policy changes that led to mitigated injuries and more protection in the battlefield. "It's all about developing a system that performs surveillance on medical issues in real time," Pearse said. "Issues that affect our soldiers."

Pearse's work with inhalant abuse led to a military exchange system to sell only products that contain a bitterant to discourage misuse. "Inhalant abuse was the leading cause of drug-related death in theater," she said. She worked with the Combat Readiness Center and U.S. Army Center for Health Promotion and Preventive Medicine to get the message about inhalant abuse out to the military community. "We asked the Army and Air Force Exchange Service to eliminate the sale of the product without bitterant," Pearse said. "This has helped cut the number of inhalant abuse deaths in half."

Under Pearse's leadership, the Division became the first medical examiner's office in the world to make CT-scanning a standard practice for their forensic investigations. The use of CT-scanning has enhanced the information gathered by traditional autopsy.

Announced in *U.S. Medicine*, the award recognizes the AFIP's AEMES as a vital entity in forensic investigations and research to safeguard service members



## AFIP Takes Expertise to Africa



The AFIP staff have a long history of providing skilled pathology consultation to the DoD worldwide, and in 2008, that expertise was once again taken abroad. Dr. Ann Nelson, Chief of AIDS Pathology at the AFIP, went to Uganda in a vital mission that aimed to greatly improve HIV/AIDS diagnostic knowledge and skills among Ugandan pathologists and trainees. The project successfully established case-based instructional method for teaching HIV/AIDS pathology to medical students, trainees, and technicians, as well as developed locally appropriate protocols and data instruments for HIV/AIDS-related co-morbidities, and compiled teaching cases using organ and systemic method to host locally and on the web.

In collaboration with the PEPFAR/JHU Global Education Partnership, the Department created local and Internet databases holding thousands of cases for review. Dr. Nelson helped developed education materials to create a database that held autopsy, biopsy, and clinical laboratory cases. Another agenda of the project determined if the existing pathology and laboratory capacity is sufficient to meet the need for diagnosis and treatment of HIV and AIDS related conditions.

The AFIP set out to improve the quality of Africa's histopathology, by setting standardized guidelines, bringing in well-maintained, functional equipment and instrumentation, demonstrating proper cutting and staining techniques,

and reviewing case reporting. With Dr. Nelson's guidance, the communities in Uganda, Mulago and Makerere improved their infrastructure and continuing education capabilities. Dr. Nelson met with the principal, dean, and heads of Departments to identify areas of interest and suggestions for improved histopathology interaction, as well as met with representatives of Mulago and Makerere affiliated programs to identify potential areas of collaboration with histopathology. AFIP also implemented modern upgrades to the center, by introducing the essential instrumentation for telepathology, and digitizing slides for easier, quicker consultation. The virtual histopathology project put in resources such as digital staining manuals and instructional online videos. AFIP also gave a series of lectures on immunology of HIV, AIDS in the tropics, and adverse drug reactions. Dr. Nelson also helped to develop a visiting professor/lecturer program in subspecialty pathology with the long-term goal to maintain electronic communication to sustain these projects and share resources.

The laboratories and classrooms in Uganda were rehabilitated and modernized, and donated equipment was installed to make way for a new invited lecturer program. The program is a series of rotations of pathology specialists whom will work in the Department of Pathology. Their presence will help develop subspecialty training, quality assurance and research projects, as well as forge stronger links between clinical services and pathology for diagnosis and teaching.

Dr. Nelson's successful stay in Africa is proof that the AFIP pathologists are preeminent in the nation, and the AFIP is a trusted resource that is called upon to help significant international projects.



# The Military Working Dog Program at the AFIP

The Department of Veterinary Pathology completed thousands of consultation cases for military working dogs in 2008. An important aspect of the ongoing work with the Department of Defense is the histopathologic assessment of tissues from military working dogs. This work is done in an effort to maintain the health and deployability of these assets for use in and out of theater. The successful program contributes to the AFIP's role as a premier veterinary pathology resource.

The AFIP's Armed Forces Medical Examiner System is also involved with the military working dogs. The AFMES Division of Forensic Toxicology provides drug training aids for a newly established program. The canisters, small enough to fit inside the palm of the hand, are composed of a tin, seal, and drug-impregnated training material, and are used successfully in drug detection training. The AFMES started the program, modeled after the former Naval Criminal Investigative Service Laboratory, when the military looked within the Department of Defense for a new venue to accomplish their mission with the working dog force. The AFIP's advanced laboratory instrumentation, combined with renowned expertise, made the Institute the right fit. The laboratories had just undergone a \$40,000 upgrade in the spring of 2008. The training materials coming out of the lab are used to help the dogs detect specific drugs. "Drug deterrence is so important," said Navy Lt. Anne L. McKeague, PhD, the program manager. "This program provides a vital service, just like with random urinalysis." The working dog program ensures that the military remains a drug-free entity, and the AFIP is proud to contribute to such a program.



## Esteemed Veterinary Residency Training Program in its 26th Year

The Department of Veterinary Pathology prides itself with its respected residency program, the only program of its kind within the Department of Defense. The 3-year curriculum is a series of courses, on-site and off-site research, and casework at the AFIP. The program is nationally and internationally renowned for its expertise in veterinary pathology instruction, resulting in residents passing the American College of Veterinary Pathologists Board examination at approximately twice the national average. By collaborating with outside organizations for biomedical research and diagnostic services, residents gain experience in understanding the mechanisms and pathogenesis of classic and emerging diseases. Residents complete necropsy rotations at the Smithsonian Institution's National Zoological Park in Washington, DC; the Maryland State Diagnostic Lab in Frederick, MD; and the National Institutes of Health in Bethesda, MD gaining wide-ranging pathology experience covering exotic, laboratory, and small animal species. Training in the specialty of veterinary pathology is a military medical tradition dating back to World War II, when the first Veterinary Pathology Section was established at the Army Medical Museum. The AFIP assumed responsibility for the sole DoD veterinary pathology residency program in 1983. Army veterinary pathologists are assigned to the Medical Research and Materiel Command in a variety of domestic and international locations. The program is so honored in the medical community that residents from civilian universities seek out the AFIP's veterinary pathology educational programs for further study and resources. In 2008, the AFIP took its didactic course abroad, holding a Descriptive Veterinary Pathology course in Dublin, Ireland. The training program has become an essential educational resource for the military and the global veterinary pathology community.



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